



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,005	11/26/2003	Alexei A. Erchak	16459-012001	7534
26161	7590	08/18/2004	EXAMINER	
FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			NADAV, ORI	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 08/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/724,005

Applicant(s)

ERCHAK ET AL.

Examiner

ori nadav

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The abstract of the disclosure is objected to because the abstract does not describe the invention. Correction is required. See MPEP § 608.01(b).

Drawings

The formal drawings filed on 11/26/2003 are acceptable.

Information Disclosure Statement

If applicant is aware of any relevant prior art, he/she requested to cite it on form PTO-1449 in accordance with the guidelines set forth in M.P.E.P. 609.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2811

Claims 1-5, 7-11 and 15-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (6,469,324).

Wang teaches in figures 13 and 14 and related text a method of making a light-emitting device, the method comprising: connecting a layer of a reflective material 182A with a layer of p-doped material 16, wherein:

the light-emitting device comprises a multi-layer stack of materials including the layer of p-doped material 16, a light-generating region 122, and a first layer 14A;

the first layer 14A includes a surface having a dielectric function that varies spatially according to a pattern; and

the reflective material 182A is capable of reflecting at least about 50% of light generated by the light-generating region that impinges on the layer of reflective material.

Wang does not state in the embodiment of figures 13-14 bonding the layer of a reflective material 182A with the layer of p-doped material 16.

Wang teaches in the embodiment of figure 10 bonding the layer of a reflective material with the LED wherein the layer of p-doped material is located (column 5, lines 50-52).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to bond the layer of a reflective material 182A with the layer of p-doped material 16 in Wang's device in order to provide good contact between the layers of the device.

Regarding claims 2-4, 11 and 15-19, Wang teaches before bonding the layer of the reflective material with the layer of p-doped material, bonding the first layer with a

Art Unit: 2811

substrate, the multi-layer stack of materials being between the substrate and the layer of reflective material (column 6, lines 12-57),

forming a bonding layer 180A between the first layer and the substrate,

removing the substrate,

wherein removing the substrate results in the surface of the first layer becoming

substantially flat,

forming the pattern in the surface of the first layer, forming the pattern includes using nanolithography, wherein the pattern has features that are greater than about $A/5$, where

A is a wavelength of light that can be emitted by the first layer, and

disposing a substrate on the layer of reflective material, and

disposing a current-spreading layer between the first layer and the light-generating region.

Regarding claims 20-22, Wang teaches the light-emitting device is selected from the group consisting of light-emitting diodes, lasers, optical amplifiers, and combinations thereof, wherein the light-emitting device comprises a light emitting diode, and wherein the light-emitting device is selected from the group consisting of OLEDs, flat surface-emitting LEDs, HBLEDs, and combinations thereof.

Regarding claims 7-8 and 25-26, Wang teaches removing the substrate includes heating a bonding layer disposed between the first layer and the substrate, wherein

Art Unit: 2811

heating the bonding layer naturally decomposes at least a portion of the bonding layer (column 6, lines 35-57).

Regarding claims 5, 9-10, 24 and 27-28, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use lapping and polishing steps after removing the substrate, and heating the bonding layer by exposing the bonding layer to radiation emitted by a laser and removing the substrate by exposing the substrate using a laser liftoff process in Wang's device in order to improve the bond between the layers of the device.

Regarding claims 23 and 29, Wang teaches disbonding the substrate bonded with the first layer, wherein disbonding the substrate results in the bottom surface of the first layer becoming substantially flat.

Regarding claims 30-32, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to planarize a surface of the first layer after the first substrate is disbanded, wherein planarizing the surface of the first layer includes chemical-mechanical polishing the surface of the first layer, such that a roughness of the surface of the first layer is reduced to greater than about $A/5$, where A is a wavelength of light that can be emitted by the first layer, in Wang's device in order to provide better bonding between the layers of the device by a conventional planarizing process.

Art Unit: 2811

Regarding claims 33, 35 and 36, Wang teaches that after disbonding the substrate, forming the pattern in the surface of the first layer, wherein the pattern has features that are greater than about $A/5$, where A is a wavelength of light that can be emitted by the first layer,

wherein the first layer comprises a layer of an n-doped material, the multi-layer stack further includes a layer of p-doped material, and the light-generating region is between the layer of p-doped material and the layer of n-doped material.

Regarding claim 34, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use nanolithography when forming the pattern in order to use conventional methods of forming a pattern.

Regarding claims 37 and 38, the surface of the first layer has features with a size of less than about $\lambda/5$, where λ is a wavelength of light that can be generated by the light-generating region and that can emerge from the light-emitting device via the surface of the first layer.

Allowable Subject Matter

Claims 6 and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Reasons for allowance

The following is an examiner's statement of reasons for allowance: Wang

(6,469,324). teach substantially the entire claimed structure, as recited in claims 1, 2 and 4, except removing the substrate after bonding the layer of the reflective material with the first layer, and before forming the pattern in the surface of the first layer, planarizing the surface of the first layer after the first substrate is removed, respectively. Therefore, prior art do not teach or render obviousness the semiconductor structure, as claimed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References B-D are cited as being related to a method of forming an LED.

Papers related to this application may be submitted to Technology center (TC) 2800 by facsimile transmission. Papers should be faxed to TC 2800 via the TC 2800 Fax center located in Crystal Plaza 4, room 4-C23. The faxing of such

Art Unit: 2811

papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The Group 2811 Fax Center number is (703) 308-7722 and 308-7724. The Group 2811 Fax Center is to be used only for papers related to Group 2811 applications.

Any inquiry concerning this communication or any earlier communication from the Examiner should be directed to *Examiner Nadav* whose telephone number is **(571) 272-1660**. The Examiner is in the Office generally between the hours of 7 AM to 4 PM (Eastern Standard Time) Monday through Friday.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Technology Center Receptionists** whose telephone number is **308-0956**

A handwritten signature in black ink, appearing to read 'Ori Nadav', is positioned above the typed name and title.

O.N.
8/16/04

ORI NADAV
PATENT EXAMINER
TECHNOLOGY CENTER 2800